Council Agenda #6C
June 24, 2008

Staff Report

DISCUSSION AND DIRECTION ON TRAFFIC CONDITIONS ALONG RALSTON AVENUE BETWEEN NOTRE DAME AVENUE AND SIXTH AVENUE

Honorable Mayor and Council Members:

Summary
The City Council authorized the Public Works Department to apply for a Bay Area Air Quality Management District grant for a roundabout at the intersection of Ralston Avenue and South Road pending an analysis of traffic along Ralston Avenue between Notre Dame Avenue and Sixth Avenue. This project was also established as part of the Priority Process.

Public Works staff evaluated the following scenarios for both the AM and PM peak commuter periods in the subject study area:

- Existing traffic volumes and conditions
- Existing traffic volumes with a roundabout at South Road
- Existing traffic volumes with a traffic signal at South Road
- Existing traffic volumes with a traffic signal at South Road and a roundabout at the entrance to Notre Dame de Namur.

The analysis indicated the construction of a roundabout at South Road would require encroachment into Twin Pines Park and the construction of a number of retaining walls. The construction costs would be significantly more than the grant funds provided for the project. The analysis actually indicates the most appropriate traffic control device for the intersection of Ralston Avenue and South Road is a traffic signal.

Additional analysis was conducted to determine whether or not a roundabout could be an effective traffic control device at the intersection of Ralston Avenue and the entrance to Notre Dame de Namur. The analysis indicates there is enough land space for a roundabout and that the installation of a roundabout will help control overall speeds along Ralston Avenue, safely facilitate in the egress of vehicles from Notre Dame de Namur University, and improve the ability for traffic wishing to travel west from Chula Vista by making a right turn and heading east on Ralston and traveling through the roundabout to head west.

Background

The City Council authorized the Public Works Department to apply for a Bay Area Air Quality Management District grant for the installation of a roundabout at the intersection of Ralston Avenue and South Road pending an analysis of traffic conditions along Ralston Avenue between Notre Dame Avenue and Sixth Avenue.

Public Works staff collected traffic volumes for a week period on all the approaches to the intersections of Ralston Avenue and:

- El Camino Real
- Sixth Avenue
- South Road
- Notre Dame de Namur entrance
- Chula Vista Drive
- Notre Dame Avenue

The traffic volumes were provided to a traffic and transportation engineering consulting firm who analyzed the existing operations at each of the intersections and provided a computer simulation of the following scenarios:

- Existing Conditions
- Roundabout at South Road
- Traffic signal at South Road

Public Works staff decided to expand the analysis to consider the installation of a roundabout at the entrance to Notre Dame de Namur. The reason is that the average daily traffic volumes are near identical to the traffic volumes on South Road and there are currently no traffic control devices to facilitate the safe egress out of the University. In addition, staff wanted to verify whether or not a roundabout would be effective in providing a more uniform speed of vehicles traveling along Ralston between Sixth Avenue and Notre Dame.

Discussion

A traffic simulation model was established for Ralston Avenue between Notre Dame and Sixth Avenues. The simulation model was calibrated to reflect the existing traffic control devices and traffic volumes collected by the City. The existing scenario is the baseline scenario that was compared to the other scenarios that were created.

Traffic simulation models were developed to analyze the intersection of Ralston Avenue and South Road for both a roundabout and a traffic signal to determine the impact, if any, on the entire segment of Ralston Avenue between Notre Dame and Sixth Avenues. The average travel time (in minutes) and the average travel speed (in mph) for the entire 3,540 foot segment of Ralston was determined.

Table 1:
Average travel times[1] through corridor -
3,540 feet from Notre Dame Ave. to 6th Ave.

Scenario	Average Travel Time (minutes)		Average Travel Speed assuming 3,540 feet (mph)	
	EB	WB	EB	WB
Existing AM	3.8	2.5	10.6	16.1
Existing PM	2.9	3.4	13.7	11.8
Signalized AM	2.1	2.2	18.8	17.9
Signalized PM	2.3	2.2	17.2	18.4
Roundabout AM	2.5	2.4	16.0	16.9
Roundabout PM	2.0	2.8	19.8	14.6

Notes:
[1] Average travel times based on VISSIM simulation model.

The results of the traffic simulation models in Table 1 indicate that a traffic signal at the intersection of Ralston Avenue and South Road has the lowest average travel time and the highest average travel speed of the three scenarios followed closely by the roundabout. It should be noted that all of the average travel speeds are within acceptable levels.

The following table provides the 15-minute peak period average delays for the movements at the various intersections within the study area:

Table 2:
15-Minute peak period average delays[1] for movements / intersections

Scenario	Chula Vista / Ralston Ave.			NDNU Entrance / Ralston Ave.			South Rd. / Ralston Ave.		
	NBL (seconds)	NBR (seconds)	WBL (seconds)	SBL (seconds)	SBR (seconds)	EBL (seconds)	SBL (seconds)	SBR (seconds)	Overall (seconds)
Existing AM	75.8	81.8	56.2	27.3	21.2	2.7	6.4	5.8	24.8
Existing PM	24.5	50.4	67.5	21.7	25.2	1.7	7.1	6.7	51.5
Signalized AM[2]	42.3	58.4	55.6	25.5	26.4	1.9	10.6	8.2	2.8
Signalized PM[2]	20.7	20.4	56.2	21.8	32.3	2.3	22.1	9.8	2.2
Single-lane Roundabout AM	31.7	54.6	48.5	36.1	38.3	2.3	19.0	23.7	11.6
Single-lane Roundabout PM	14.1	15.9	31.8	30.1	36.4	1.9	70.2	86.8	17.6
Double-lane Roundabout AM[3]									3.0
Double-lane Roundabout PM[3]									3.0

Notes:
[1] Average delays based on VISSIM simulation model.
[2] Assumes the shared eastbound through/left-turn lane is permitted; however, delay results at the study intersections was similar with a protected eastbound left-turn lane.
[3] Based on isolated intersection analysis (without the use of the VISSIM simulation model) using the methodologies outlined in *Roundabouts: An Informational Guide* (FHWA, 2000).

Table 2 indicates that a roundabout or a traffic signal at the intersection of Ralston Avenue and South Road will significantly reduce vehicle delays of vehicles turning from Chula Vista onto Ralston Avenue in either direction during both the AM and PM peak periods. Both the roundabout and a traffic signal provide greater opportunities for gaps in traffic to facilitate the turning movements from Chula Vista to Ralston Avenue.

The installation of a roundabout or a traffic signal at the intersection of Ralston Avenue and South Road will not improve the ability of vehicles egressing from Notre Dame de Namur. The primary reason is that the distance from South Road and the University's entrance is not far enough from South Road to allow for gaps wide enough to facilitate traffic egressing from the University.

Table 2 further indicates that vehicle delays for southbound left and right turns from South Road

to Ralston Avenue will increase with both a roundabout or a traffic signal. However, the overall delay to the intersection will be significantly improved with both a roundabout or a traffic signal. A traffic signal provides the greatest reduction of vehicle delays.

Constructability:

The challenge of a roundabout at Ralston Avenue and South Road is the physical width requires additional right-of-way. Exhibit 1 provides the conceptual layout of a roundabout at South Road. The conceptual plan indicates that an additional 7,000 square feet is needed to facilitate the layout of the roundabout. The additional square footage would have to be either acquired from the 1000 South Road development or taken from Twin Pines Park. In either case, significant retaining walls would have to be constructed to facilitate the proposed geometrics for the roundabout. The preliminary cost analysis to build the retaining walls is between $400,000 and $500,000. This does not include the cost of acquiring any additional right-of-way.

The cost of a traffic signal is estimated to be approximately $200,000.

Consideration of Roundabout at Notre Dame de Namur Entry Road:

There have been concerns over the years regarding the safety of vehicles egressing from Notre Dame de Namur entry road to travel eastbound on Ralston Avenue. A merge lane was installed on Ralston Avenue east of the University's entrance to facilitate traffic making the left turn when Ralston Avenue was resurfaced five years ago. Still, it is challenging for even the most skilled vehicle driver to exit from the entry road.

The traffic volume data collection indicated that the traffic volumes for the South Road approach to Ralston Avenue are near the traffic volumes exiting from Notre Dame de Namur. The difference between the two locations is the South Road intersection is controlled by all-way STOPs and the entrance to the university is not.

Staff decided to investigate the impact on traffic if a roundabout was installed on Ralston Avenue at the entry road of Notre Dame de Namur. The analysis assumes a traffic signal will be installed at the intersection of South Road and Ralston Avenue. First, a determination as to whether or not a roundabout could physically be located at this location. Exhibit 2 provides a conceptual layout of a roundabout. The layout can be physically located at this location with minor modifications to the University's road to Ralston Hall. The layout will require Notre Dame de Namur to provide a public easement across their property to facilitate the construction of the roundabout.

Table 3:
15-Minute peak period average delays[1] for movements / intersections

Scenario	Chula Vista / Ralston Ave.			NDNU Entrance / Ralston Ave.				South Rd. / Ralston Ave.		
	NBL (second)	NBR (second)	WBL (seconds)	SBL (seconds)	SBR (seconds)	EBL (seconds)	Overall (seconds)	SBL (seconds)	SBR (seconds)	Overall (seconds)
Existing AM	75.8	81.8	56.2	27.3	21.2	2.7	13.4	6.4	5.8	24.8
Existing PM	24.5	50.4	67.5	21.7	25.2	1.7	12.3	7.1	6.7	51.5
NDNU Roundabout AM[2]	52.0	84.5	50.4	28.0	23.0	9.3	8.6	8.7	7.7	3.9
NDNU Roundabout PM[2]	29.7	24.3	64.9	18.7	17.7	4.3	6.9	11.0	7.7	5.1

Notes:
[1] Average delays based on VISSIM simulation model.
[2] This scenario includes a single-lane roundabout at the Ralston Avenue/NDNU Entrance intersection and a traffic signal (with a protected eastbound left-turn lane) at the Ralston Avenue/South Road intersection.

The traffic simulation model indicates the roundabout will reduce vehicle delays during the PM peak period for vehicles to exiting the University in both the eastbound and westbound directions. There is no significant improvement of vehicle delays for vehicles exiting during the AM period.

The traffic simulation model also indicates that there will be significant reduction in vehicle delays for vehicles making a left turn off of Chula Vista onto Ralston Avenue during the AM peak period. There is no significant change in vehicle delays for vehicles making a right turn off of Chula Vista onto Ralston Avenue or westbound Ralston left turning traffic onto Chula Vista.

The roundabout provides an additional means to control the speeds of vehicles traveling along Ralston Avenue in this area. The roundabout will make it easier for Chula Vista vehicle drivers who want to travel west on Ralston and do not feel comfortable turning left. These drivers would make a right turn onto Ralston Avenue and then travel through the roundabout at the University's entrance and then travel west. This may slightly increase the travel trip but may reduce their overall travel time.

Bay Area Air Quality Management District Grant:

The Bay Area Air Quality Management District (BAAQMD) awarded a $500,000 grant to the City of Belmont to convert the existing all-way STOPs at the intersection of Ralston Avenue and South Road to a roundabout. The reason the grant was approved was that it was going to improve the traffic flow and significantly reduce energy consumption and improve air quality by eliminating the need of 25,000 vehicles per day to stop for 600 vehicles per day turning from

South Road onto Ralston Avenue.
The traffic simulation models have proven the installation of a traffic signal at Ralston Avenue and South Road will have comparable improvements to traffic flow, reduction of energy consumption and improvement to the air quality as a roundabout. The construction of a roundabout provides challenges and requires an additional 7,000 square feet of right-of-way. This makes the cost of installation infeasible with the funds that are available from the grant.

The analysis indicates that a roundabout at the Notre Dame de Namur University entrance is feasible and could be constructed in a more cost effective manner than at South Road. The University's entrance has similar traffic volumes as South Road. The roundabout would decrease delays of vehicles egressing the University and will help control a more uniform speed along Ralston within the study area.

Staff seeks direction from Council to approach BAAQMD to modify our grant application for the installation of a traffic signal (approximately $200,000) at the intersection of Ralston Avenue and South Road. If the BAAQMD agrees to the proposed change, staff will negotiate to use the balance of the grant funds (approximately $300,000) to be used for the construction of a roundabout at the University's entrance.

A future roundabout at the University entrance will require Notre Dame de Namur to grant the necessary right-of-way for a roundabout and may require some matching funds for the construction of the roundabout. The University does have a condition of development on their Master Plan to install a traffic signal at the intersection of Ralston Avenue and South Road. These funds could be used to match the grant funds to construct a roundabout at the University's entrance.

General Plan/Vision Statement
The Vision Statement reads "We put a priority on getting out of, into, and through town efficiently. We require safe residential streets and smooth-flowing thoroughfares."

Fiscal Impact
There is no fiscal impact as the result of the recommendations in this report.

Public Contact
Posting of the City Council Agenda

Recommendation
It is recommended City Council authorize staff to meet with BAAQMD:

1. To modify the grant application from a roundabout at the intersection of Ralston Avenue and South Road to a traffic signal, and,
2. To request the balance of the grant to be used for the construction of a roundabout at Ralston Avenue and the entrance to Notre Dame de Namur University.

Alternatives

1. Take no action.
2. Refer back to staff for further information.
3. Deny approval.

Attachments

A. Exhibit 1 - Conceptual layout of a roundabout at South Road
B. Exhibit 2 - Conceptual layout of a roundabout at Notre Dame de Namur

Respectfully submitted,

Raymond E. Davis III, PE, PTOE	Jack R. Crist
Director of Public Works	City Manager

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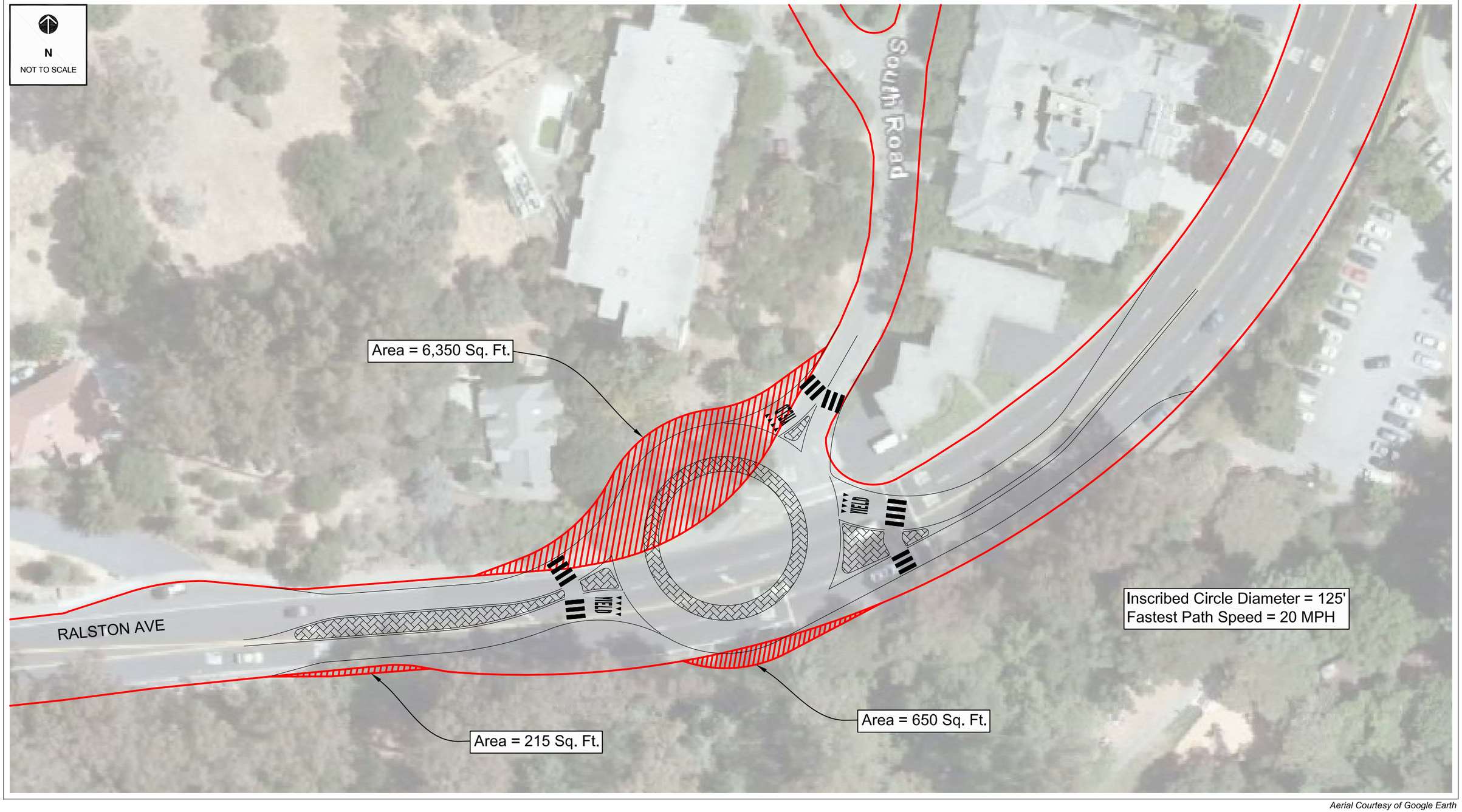

Aerial Courtesy of Google Earth

ATTACHMENT A

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Mar 03, 2008 JM
N:\Roseville Projects\RS07-2522 Belmont\CAD\roundabout Single Lane.dwg

SINGLE LANE ROUNDABOUT CONCEPT
RALSTON AVE / SOUTH ROAD
CITY OF BELMONT, CA

EXHIBIT 1

N

NOT TO SCALE

NOTRE DAME DE NAMUR UNIVERSITY

Area = 2,600 SQFT

Area = 8,400 SQFT

Area = 1,800 SQFT

RALSTON AVE

Inscribed Circle Diameter = 110'
Fastest Path Speed = 20 MPH

Aerial Courtesy of Google Earth

ATTACHMENT B

FEHR & PEERS
TRANSPORTATION CONSULTANTS

Mar 28, 2008 JM
N:\Roseville Projects\RS07-2522 Belmont\CAD\rev 3 Single Lane ND.dwg

SINGLE LANE ROUNDABOUT CONCEPT
RALSTON AVE / NOTRE DAME DE NAMUR UNIVERSITY
CITY OF BELMONT, CA

EXHIBIT 2